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This Technology is Quick, Cheap, Environmentally Safe in a Word: Perfect

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THIS TECHNOLOGY IS QUICK, CHEAP, ENVIRONMENTALLY SAFE
IN A WORD: PERFECT

DAYTON, Ohio -- A University of Dayton researcher has developed a tool to help the Air Force determine whether jet fuels contain compounds that promote deposits that could damage engines.

Called PERFECT, the new technique is faster, cheaper and environmentally safer than the current standard test approved by the American Society for Testing and Materials (ASTM), according to Robert Kauffman, a chemist in the University of Dayton Research Institute who developed the technology.

"The ASTM test is rather cumbersome, unreliable and requires chlorinated solvent, a hazardous waste that the federal government has banned because it contributes to ozone depletion and is a health hazard," Kauffman said.

PERFECT stands for Peroxide in Fuel Estimation and Concentration Test. The size of a hand-held calculator, the testing device looks deceptively simple. An operator sticks the probe attached to the battery-operated instrument into a vial containing a prepared solution of jet fuel. In seconds, the instrument prints out a reading of the peroxide content of the fuel.

"Peroxides lead to gums and deposits and clogged fuel nozzles -- all of which can damage an aircraft's engine," Kauffman said. "It's the same reason why it's recommended that you empty your lawn mower's gasoline tank before the winter."

The PERFECT technology is becoming the standard method at Wright-Patterson Air Force Base of determining the peroxide level in jet fuels used to cool aircraft components.

"New-generation aircraft heat the fuels to temperatures higher than seen in the past,

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which increases the amount of peroxides," said Bill Harrison, section chief of fuels development in the Fuels Branch at Wright Laboratories. "This new test is extremely simple. You stick a probe in a beaker and flip a few switches."

The Air Force believes this technology should replace the ASTM standard. "We'd like to see this technology transferred to the commercial sector and become a standardized test method," Harrison said.

The potential market for the PERFECT instrument includes manufacturers of aircraft engines, sealants, fuel lines and fuel tanks, Kauffman said. The technology could even have applications in the food industry in testing for spoilage in pre-packaged foods like potato chips or in the environmental arena for testing for peroxide content in hazardous wastes.

Gem City Engineering in Dayton has produced a prototype of the hand-held device, which Kauffman says costs between $750 to $1,500 to build. A larger laboratory model hooked to a computer would cost about $3,000.

The PERFECT technology is a spin-off from Kauffman's "smart dipstick" invention, recognized last year as one of the 100 most technologically significant product innovations of 1992. The "smart dipstick," or RULER (Remaining Useful Life Evaluation Routine), can be used to quickly and scientifically pinpoint when it's time to change jet engine oil, car oil -- even cooking oil -- by calculating what's left of the antioxidant, an additive that keeps oil from degrading too fast. The Air Force used the device during Operation Desert Storm to analyze oil samples from A-10 aircraft engines.

The new technology has been developed as part of a five-year $11.5 million contract the University of Dayton Research Institute won last year to develop a more efficient fuel that would allow jets and other military craft to carry significantly less excess fuel for cooling engine parts.

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